CLAIMS

What is claimed is:

1. A method of screening a compound library or portion thereof by absorption, said method comprising:

(i) screening a primary compound library or portion thereof having a plurality of test samples containing isolated compounds or isolated mixtures of compounds per test sample by generating an *in vivo* absorption profile for each of said test samples from initial dose data and from *in vitro* bioavailability data comprising permeability and solubility data, and optionally dissolution rate and transport mechanism data for each of said test samples, wherein said absorption profile is characterized by one or more of rate of absorption, extent of absorption, and concentration of a test sample relative to a selected site of administration and a selected sampling site for one or more physiological barriers to absorption of a mammalian system of interest;

(ii) selecting compounds having a desired absorption profile; and

(iii) producing a secondary compound library comprising the selected compounds, and optionally repeating steps (i) through (iii) one or more times, whereby said compound library or portion thereof is screened by absorption.

2. The method of claim 1, wherein said *in vivo* absorption profile is generated by providing said initial dose data and said *in vitro* bioavailability data to a computer-implemented pharmacokinetic tool (PK tool), wherein said PK tool comprises as computer-readable components, an input/output system, a simulation engine, and a simulation model comprising a physiological model of said mammalian system of interest, wherein said input/output system, simulation engine and simulation model are capable of working together to carry out the steps of:

(i) receiving through the input/output system as input data, said initial dose data and said *in vitro* bioavailability data for one or said test samples; and

(ii) generating as output data a simulated *in vivo* absorption profile for said test sample.

3. The method of claim 1, which further comprises: (iv) screening said secondary compound library by one or more properties in addition to absorption; (v) selecting compounds by one or more of said properties, and (vi) producing one or more compound libraries characterized by absorption, and one or more of said properties.

4. The method of claim 3, wherein said one or more properties in addition to absorption is selected from the group consisting of metabolism, toxicity and activity.

5. A method of screening a compound library or portion thereof by absorption, said method comprising:

(i) screening a compound library or portion thereof having a plurality of test samples containing isolated compounds or isolated mixtures of compounds per test sample by generating a simulated *in vivo* absorption profile for each of said test samples from initial dose data and from *in vitro* bioavailability data comprising permeability and solubility data, and optionally dissolution rate and transport mechanism data for each of said test samples, wherein said simulated absorption profile is characterized by one or more of rate of absorption, extent of absorption, and concentration of a test sample relative to a selected site of administration and a selected sampling site for one or more physiological barriers to absorption of a mammalian system of interest, wherein said simulated *in vivo* absorption profile is generated by:

a. providing said initial dose data and said *in vitro* bioavailability data to a computer-implemented pharmacokinetic tool (PK tool) which comprises as computer-readable components, an input/output system, a simulation engine, and a simulation model comprising a physiological model of said mammalian system of interest, wherein said input/output system, simulation engine and simulation model are capable of working together to carry out the steps of:

b. receiving through the input/output system as input data, said initial dose data and said *in vitro* bioavailability data for one or said test samples; and

c. generating as output data a simulated *in vivo* absorption profile for said test sample;

(ii) selecting compounds having a desired absorption profile; and

(iii) producing a secondary compound library comprising the selected compounds, and optionally repeating steps (i) through (iii) one or more times, whereby said compound library or portion thereof is screened by absorption.

6. The method of claim 5, wherein said physiological model is a mathematical model of said mammalian system comprising as operably linked components: (i) differential equations for calculating solubility and absorption of a test sample for one or more physiological segments of the mammal system of interest; and (ii) initial parameter values for the differential equations corresponding to physiological parameters and one or more selectively optimized adjustment parameters, and optionally one or more regional correlation parameters, for one or more physiological segments of said mammal system of interest; and optionally (iii) control statement rules for one or more of absorption, permeability, solubility, dissolution, concentration, and mathematical error correction, for one or more physiological segments of said mammal system of interest.

7. The method of claim 1 or 6, wherein said permeability and said transport mechanism data is derived from a cell-based assay.

8. The method of claim 1 or 6, wherein said solubility and said dissolution rate data is derived from a chemical-based assay.

9. The method of claim 6, wherein one or more said permeability data is derived from structure activity relationship information of one or more compounds of said compound library.

10. The method of claim 6, wherein said solubility data is derived from structure activity relationship information of one or more compounds of said compound library.